Antelope 5 + 6

TECHNICAL REPORT R-3 77-11

SIMULATED YIELD TABLES FOR DWARF MISTLETOE MANAGEMENT IN PONDEROSA PINE STANDS (SWYLD2 PROGRAM)

PHASE I. TWO-STORIED STANDS

Chalender Ranger District
Kaibab National Forest
Arizona

1977

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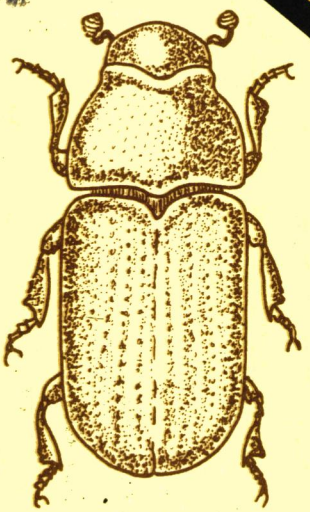

Southwestern Region

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Chalender Ranger District
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Arizona

1977

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INTRODUCTION

Southwestern dwarf mistletoe (Arceuthobium vaginatum subsp. cryptopodum) is the most destructive forest disease in the Southwest. This disease causes growth loss, mortality, deformity, and reduced seed production in infected trees. Timber volume yield is reduced proportionate to the level of mistletoe infestation in a stand. Volume loss in an infested stand may be 10 to 40 percent or more over a rotation. Silvicultural control of dwarf mistletoe is the most efficient method of reducing adverse effects caused by this disease. Removal of mistletoe-infected trees during precommercial and commercial thinning operations is an efficient way to suppress a dwarf mistletoe infestation.

Timber volume loss resulting from a dwarf mistletoe infestation is difficult to assess by direct observation. The effectiveness of silvicultural treatments that reduce mistletoe levels is variable. Researchers have developed a simulated yield program (SWYLD2) that will aid land managers in assessing these problems (Myers, Edminster, and Hawksworth 1976). The SWYLD2 program is designed for use in even-aged or two-storied stands of ponderosa pine. Stands may be either dwarf mistletoe-infested or non-infested. Yield tables generated by the SWYLD2 program help the land manager evaluate management alternatives through examination of simulated yields produced under selected options.

The SWYLD2 program is being evaluated for implementation in the Southwestern Region. Areas were selected in various parts of the Region for development of simulated yield tables for mistletoe-infested stands. The program for implementation of SWYLD2 consists of three phases: I. Development of yield tables for selected stands infested with dwarf mistletoe, II. Evaluation of these stands managed with the aid of SWYLD2 simulations, and III. Implementation of SWYLD2 as a tool in developing timber management programs in mistletoe-infected stands in Region 3. This report is one of a series to be issued during the implementation process.

OBJECTIVE

The purpose of this project was to develop simulated yield tables for a two-storied, dwarf mistletoe-infested ponderosa pine stand on Chalender Ranger District, Kaibab National Forest. This report summarizes Phase I of the SWYLD2 implementation program on Chalender Ranger District.

PROCEDURE

The following procedure constituted Phase I for this project:

1. Collect data necessary for input in the SWYLD2 program from a two-storied, dwarf mistletoe-infested ponderosa pine stand.

2. Combine data with various management alternatives selected by the land manager and produce simulated yield tables for the sampled area.

3. Assist the land manager in interpreting yield tables and selecting the best combination of management alternatives in a dwarf mistletoe-infested stand.

4. Assist the land manager in planning implementation of selected management alternatives.

METHODS

A stand of two-storied ponderosa pine infested with dwarf mistletoe was sampled in 1976 by forestry technicians from the Forest Insect and Disease Management Staff Unit and Kaibab National Forest.

Sampling Procedure

1. A road log was made from Williams, Arizona, to the survey area, and the stand, as delineated on aerial photographs, was located on the ground.

2. Age (at d.b.h.) and height measurements were taken on 15 codominant or dominant ponderosa pine trees in each of the two stories.

3. Age and height measurements were taken on 11 dominant ponderosa pines for determination of site index.

4. Sample points were located on an 8-chain grid pattern throughout the area; a .01-acre circular plot was established at each sample point; presence or absence of dwarf mistletoe and d.b.h. were recorded for all live trees 4.5 feet or more in height and less than 6 inches d.b.h.; at the same sample point, a 20 BAF variable-size plot was established; the same variables as in the fixed plot were recorded for live trees 6 inches or greater d.b.h.; in addition, all trees marked for cut in an upcoming timber sale were noted; data were recorded on automatic data processing forms.

5. Survey data were processed through the NSEC/VI computer program, which summarized field data and provided per-acre estimates of numbers of trees, basal area, and percent of trees infected with dwarf mistletoe by 1-inch diameter classes; site index, mean d.b.h. of the tree of average basal area, average age, and average height were also calculated from the data. Information on trees marked for cut was summarized also. The summarized data were combined with management alternatives obtained from land managers and then processed through the simulated yield program SWYLD2.

RESULTS AND DISCUSSION

A 1,191-acre area of two-storied ponderosa pine was sampled by collecting data on 186 plots. Due to a wide variation in understory tree density, the area was divided into two stands (Stands 5 and 6). Location of the survey area is indicated in Figure 1. Line, plot, and dwarf mistletoe distribution for both stands are provided in Figure 2. Plots with dwarf mistletoe had a minimum of one infected sample tree. Dwarf mistletoe was distributed throughout the sampled area.

Survey Results Summary

Stand 5	Overstory*	Understory**
Site index	81	81
Average age (years)	140	50
Average height (feet)	78	42
Number trees/acre	28	876
Basal area/acre	46	72
Average d.b.h. (inches)	17.2	3.9
Percent trees infected with dwarf mistletoe	35	16
Stand 6		
Site index	76	76
Average age (years)	130	50
Average height (feet)	87	50
Number trees/acre	28	371
Basal area/acre	38	62
Average d.b.h. (inches)	15.7	5.5
Percent trees infected with dwarf mistletoe	16	7

* Overstory = all live trees $\geq$ 12.0 inches d.b.h.
** Understory = all live trees $\geq$ 4.5 feet tall and $<$ 12.0 inches d.b.h.

This basic stand information was combined with management alternatives selected by Ranger District personnel to produce 32 sets (set = 1 overstory and 1 understory printout) of simulated yield tables for stand 5 and 11 sets for stand 6. The yield tables were discussed and evaluated with personnel from Chalender Ranger District. Six yield tables from stand 6 were selected for use as examples in this report. The SWYLD2 program converts percent trees infected with mistletoe to a stand DMR, based on the 6-class rating system. The stand DMR reflects the average mistletoe rating for all trees in a sampled area.

Because overstory management alternatives were held constant, only one overstory simulation is presented (Table 1). About one-third of the overstory basal area was removed in the first cut at age 130 (biological age), with the remainder being cut in 40 years (final removal). The first overstory cut simulated a logging from above, which reduced the dwarf mistletoe infestation (DMR) to a low level (Table 1). Based on the sample of trees actually marked for cut in the upcoming timber sale, only half the simulated mistletoe control will be realized. Thus, the buildup of mistletoe in 40 years, before final removal, will be slightly greater than that simulated in Table 1. Spread of dwarf mistletoe from infected residual overstory trees to understory is simulated for the 40-year period before final removal (Tables 1-6).

All understory simulations were made to biological age 140 (Tables 2-6). The regeneration scheme was constant, with a 3-cut shelterwood method being used. Regeneration cuts were made at ages 100, 120, and 140 (final removal). All remaining management alternatives were the same, except for thinning intensities. Various growing stock level (GSL) combinations were simulated for the initial thin and all subsequent intermediate cuts (Tables 2-6). Intermediate cuts were made from below, emphasizing removal of smaller diameter trees. A 10-year delay before the first stand entry was simulated.

Dwarf mistletoe was controlled in all simulations, although DMR was reduced to the lowest levels with an initial thinning level of 60 or 70 GSL (Tables 3 & 6 vs. Tables 2, 4, & 5). Variation in total board-foot yield over the rotation resulted from altering initial and subsequent thinning levels. A combination of low GSL's for initial and subsequent stand entries resulted in less total volume production than did the higher combinations (Table 6 vs. Tables 2-5). The effect of initially thinning to a higher GSL, and then reducing GSL in subsequent entries, is evident in Table 5. Reversing this procedure by leaving less growing stock initially and more in subsequent entries resulted in an increased yield of 1,600 board feet per acre (Table 2 vs. 5). Although GSL's of 60 produced the largest diameter trees over the rotation, total volume production

was lower than any other GSL combination (Table 6 vs. Tables 2-5). Simulated yield tables generated by the SWYLD2 program will aid land managers in selecting a combination of management alternatives that best meets current management objectives.

CONCLUSIONS AND RECOMMENDATIONS

Sufficient stand data were obtained on Chalender Ranger District for use in the simulated yield program SWYLD2. The data were combined with various management alternatives selected by Ranger District personnel, and yield tables were produced for both sampled stands. Examination of yield tables by the land manager and personnel from Forest Insect and Disease Management revealed several important factors: (1) the success of dwarf mistletoe control is dependent on management alternatives selected for use in a particular area; (2) total volume production per acre is dependent on management alternatives, particularly initial and subsequent GSL's, selected for use in a particular area; (3) although low GSL's result in larger diameter trees, they do not necessarily result in maximum volume production for an area.

The simulated yield program SWYLD2 is a useful tool for land managers. The limits of the program will be revealed after on-the-ground situations, in which simulated yield information has been used, are compared with their simulated yields. Based on results of this report, the following plan of action is recommended for the area sampled on Chalender Ranger District:

1. Select the yield table and accompanying management alternatives that best meet current management objectives, while reducing dwarf mistletoe to acceptable levels (FSM 5260).

2. Implement management alternatives selected for the first stand entry in the overstory and understory.

3. With the assistance of personnel from the Forest Insect and Disease Management Staff Unit, complete a post-treatment evaluation of the area.

4. Compare results of the post-treatment evaluation with simulated yield predictions (Phase II).

The growing stock levels used to generate yield tables for stands considered in this report are not intended as "best" growing stock levels for widespread use; however, they demonstrate the need for case-by-case selection of a suitable level based on the manager's objectives in conjunction with mistletoe management.

Instructions for use of the SWYLD2 program and detailed descriptions of management alternatives are provided by Edminster and Hawksworth (1976). Additional information on the SWYLD2 program, relative to dwarf mistletoe management, may be obtained by contacting Forest Insect and Disease Management. For general information on the SWYLD2 program, contact Forest Insect and Disease Management or Timber Management.

ACKNOWLEDGMENT

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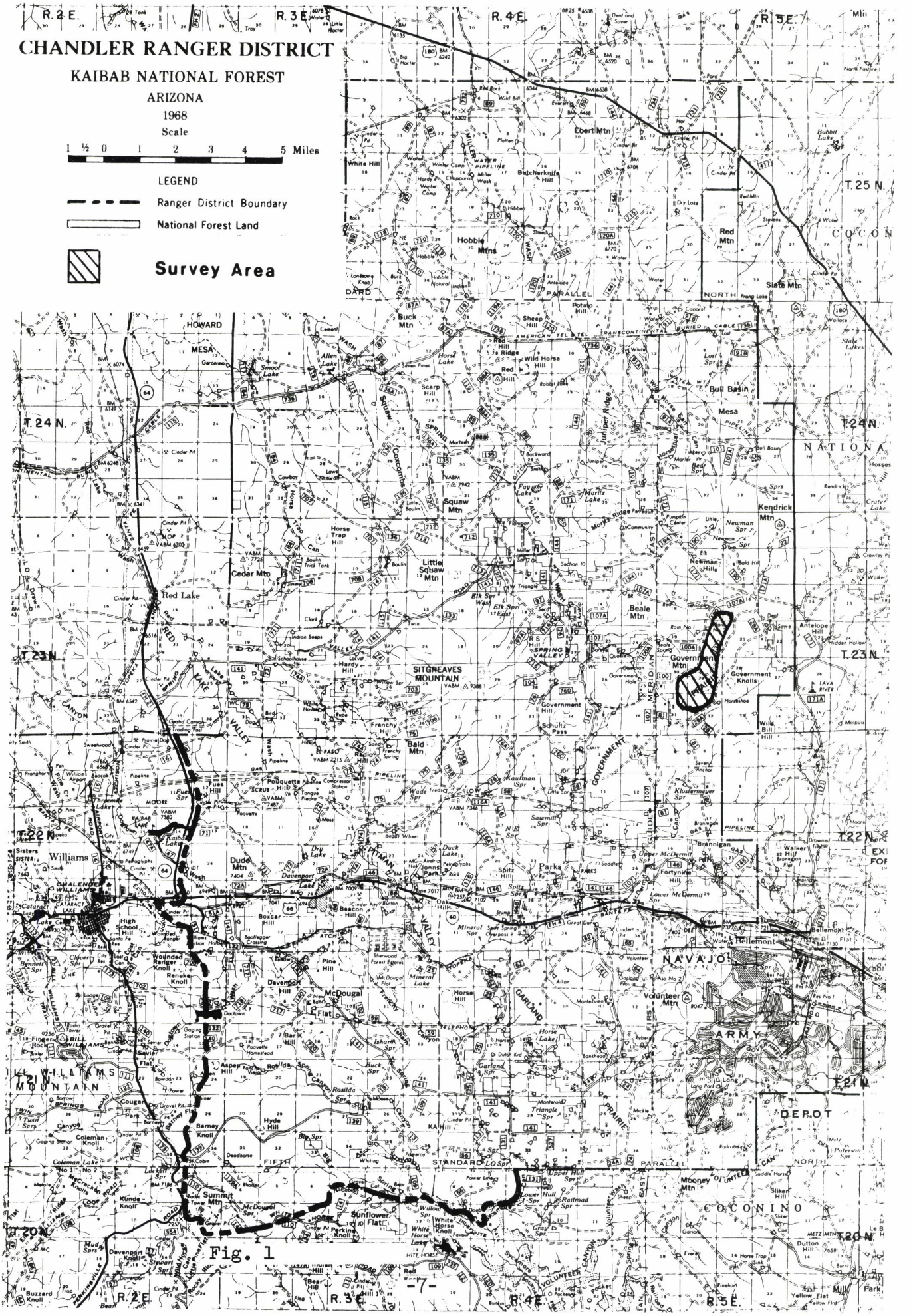
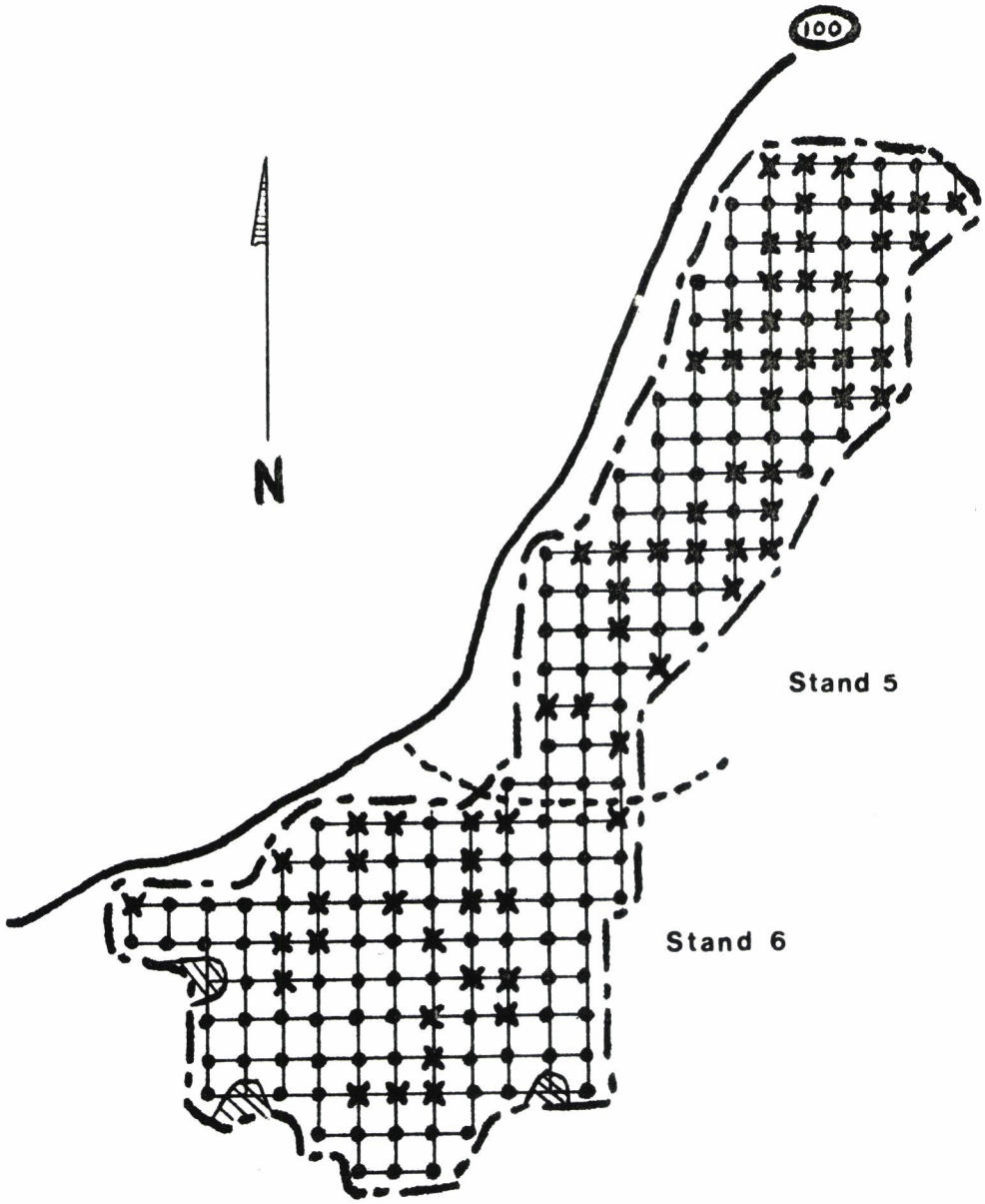
Edminster, C. B., and F. G. Hawksworth. 1976. User's guide to SWYLD2: Yield tables for even-aged and two-storied stands of southwestern ponderosa pine, including effects of dwarf mistletoe. USDA Forest Serv. Gen. Tech. Rep. RM-23. 8 pp.

Myers, C. A., C. B. Edminster, and F. G. Hawksworth. 1976. SWYLD2: Yield tables for even-aged and two-storied stands of southwestern ponderosa pine, including effects of dwarf mistletoe. USDA Forest Serv. Res. Pap. RM-163. 25 pp.


CHANDLER RANGER DISTRICT
KAIBAB NATIONAL FOREST
ARIZONA
1968
Scale
1 ½ 0 1 2 3 4 5 Miles
LEGEND
Ranger District Boundary
National Forest Land
Survey Area
R. 2 E.
R. 3 E.
R. 4 E.
R. 5 E.
T. 25 N.
T. 24 N.
T. 23 N.
T. 22 N.
T. 21 N.
T. 20 N.
Williams
Red Lake
Cedar Mtn
Squaw Mtn
Little Squaw Mtn
Sitgreaves Mountain
Bald Mtn
Dude Mtn
Bill Williams Mountain
Hobble Mtns
Red Mtn
Slate Mtn
Ebert Mtn
Bull Basin
Mesa
Kendrick Mtn
Beale Mtn
Government Mtn
Volunteer Mtn
Mooney Mtn
Sunflower Flat
Fig. 1



186 plots
1,191 acres

Scale: .5 cm = 8 chains

LEGEND
Plots with dwarf mistletoe
Plots with no dwarf mistletoe
Non-type area
Survey area boundary
Stand division
Forest road

Fig. 2.--Line and plot distribution with an indication of dwarf mistletoe presence or absence; Chalender Ranger District; T23N, R5E, Sec. 16, 17, 20, 21, 29, 30, 31, & 32.

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 116., OVERSTORY.

SITE INDEX 76
THINNING INTENSITY-- INITIAL- 38. SUBSEQUENT- 38.

STND 116 ANTELOPE SEC.6 CHALENDER RD SEPTEMBER 76

CHARACTERISTICS BEFORE AND AFTER THINNING									PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
130	.2	28	38	15.7	87	1230	1170	5000					
130	.0+	21	25	14.9	85	810	770	3200	7	13	420	400	1800
140	.1	21	29	16.0	88	970	920	4000					
150	.2	21	33	17.1	90	1140	1090	5000					
160	.4	21	37	18.0	92	1300	1250	5900					
170	.6	21	41	19.0	94	1480	1430	7000					
							TOTAL YIELDS				1900	1830	8800

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING FROM ABOVE ALLOWED IN STANDS WITH DWARF MISTLETOE.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 250. CUBIC FEET AND 1000. BOARD FEET.
PRECOMMERCIAL INITIAL THINNING ALLOWED. NONCOMMERCIAL SUBSEQUENT THINNINGS NOT ALLOWED.
AT INITIAL AGE 130., 16. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

Table 1

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 116., UNDERSTORY.

SITE INDEX 76
THINNING INTENSITY-- INITIAL- 80. SUBSEQUENT- 90.

STND 116 ANTELOPE SEC.6 CHALENDER RD SEPTEMBER 76

		CHARACTERISTICS BEFORE AND AFTER THINNING							PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
50	.1	371	61	5.5	50	1210	460	0					
60	.6	366	84	6.5	57	1780	1120	0					
60	.0+	253	64	6.8	58	1350	910	0	113	20	430	210	0
70	.5	250	83	7.8	65	1910	1510	0					
80	.9	246	99	8.6	71	2510	2130	1800					
80	.5	204	86	8.8	71	2190	1880	1800	42	13	320	250	0
90	.9	201	101	9.6	76	2810	2490	4300					
100	1.4	200	123	10.6	81	3660	3320	9000					
100	.5	82	63	11.9	82	1940	1780	6400	118	60	1720	1540	2600
110	.9	82	78	13.2	86	2520	2350	8900					
120	1.3	82	93	14.4	89	3130	2950	11900					
120	.2	22	32	16.3	91	1100	1050	4600	60	61	2030	1900	7300
130	.4	22	39	18.1	94	1410	1360	6400					
140	.7	22	47	19.8	97	1740	1680	8500					
						TOTAL YIELDS					6240	5370	18400

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 250. CUBIC FEET AND 1000. BOARD FEET.
PRECOMMERCIAL INITIAL THINNING ALLOWED. NONCOMMERCIAL SUBSEQUENT THINNINGS NOT ALLOWED.
AT INITIAL AGE 50., 7. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

Table 2

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 116., UNDERSTORY.

SITE INDEX 76
THINNING INTENSITY-- INITIAL- 70. SUBSEQUENT- 80.

STND 116 ANTELOPE SEC.6 CHALENDER RD SEPTEMBER 76

CHARACTERISTICS BEFORE AND AFTER THINNING									PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
50	.1	371	61	5.5	50	1210	460	0					
60	.6	366	84	6.5	57	1780	1120	0					
60	.0+	218	57	6.9	58	1200	830	0	148	27	580	290	0
70	.2	216	74	7.9	65	1690	1350	0					
80	.3	213	90	8.8	71	2290	1960	1900					
80	.0+	175	77	9.0	71	1980	1710	1900	38	13	310	250	0
90	.1	173	92	9.9	77	2590	2310	4500					
100	.2	172	111	10.9	81	3350	3050	9100					
100	.0+	69	56	12.2	82	1720	1590	5800	103	55	1630	1460	3300
110	.1	69	70	13.6	86	2260	2110	8200					
120	.1	69	84	14.9	89	2830	2670	11000					
120	.0+	18	28	16.8	92	960	920	4100	51	56	1870	1750	6900
130	.1	18	34	18.7	94	1240	1190	5800					
140	.1	18	41	20.5	97	1530	1490	7700					
						TOTAL YIELDS					5920	5240	17900

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 250. CUBIC FEET AND 1000. BOARD FEET.
PRECOMMERCIAL INITIAL THINNING ALLOWED. NONCOMMERCIAL SUBSEQUENT THINNINGS NOT ALLOWED.
AT INITIAL AGE 50., 7. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

Table 3

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 116., UNDERSTORY.

SITE INDEX 76
THINNING INTENSITY-- INITIAL- 80. SUBSEQUENT- 80.

STND 116 ANTELOPE SEC.6 CHALENDER RD SEPTEMBER 76

CHARACTERISTICS BEFORE AND AFTER THINNING									PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
50	.1	371	61	5.5	50	1210	460	0					
60	.6	366	84	6.5	57	1780	1120	0					
60	.0+	253	64	6.8	58	1350	910	0	113	20	430	210	0
70	.5	250	83	7.8	65	1910	1510	0					
80	.9	246	99	8.6	71	2510	2130	1800					
80	.4	179	77	8.9	71	1970	1700	1700	67	22	540	430	100
90	.8	177	93	9.8	77	2590	2310	4300					
100	1.3	176	112	10.8	81	3360	3050	8800					
100	.4	70	56	12.1	82	1710	1580	5700	106	56	1650	1470	3100
110	.8	70	70	13.5	86	2250	2110	8100					
120	1.1	70	84	14.8	89	2830	2670	11000					
120	.1	18	27	16.7	92	950	910	4100	52	57	1880	1760	6900
130	.3	18	34	18.6	94	1220	1180	5700					
140	.4	18	41	20.4	97	1520	1470	7600					
						TOTAL YIELDS					6020	5130	17600

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 250. CUBIC FEET AND 1000. BOARD FEET.
PRECOMMERCIAL INITIAL THINNING ALLOWED. NONCOMMERCIAL SUBSEQUENT THINNINGS NOT ALLOWED.
AT INITIAL AGE 50., 7. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

Table 4

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 116., UNDERSTORY.

SITE INDEX 76
THINNING INTENSITY-- INITIAL- 90. SUBSEQUENT- 80.

STND 116 ANTELOPE SEC.6 CHALENDER RD SEPTEMBER 76

CHARACTERISTICS BEFORE AND AFTER THINNING									PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
50	.1	371	61	5.5	50	1210	460	0					
60	.6	366	84	6.5	57	1780	1120	0					
60	.1	289	71	6.7	57	1490	990	0	77	13	290	130	0
70	.6	285	90	7.6	65	2070	1600	0					
80	1.0	279	107	8.4	71	2650	2220	1600					
80	.4	185	76	8.7	71	1940	1650	1400	94	31	710	570	200
90	.9	183	92	9.6	76	2560	2270	3800					
100	1.3	182	112	10.6	81	3340	3020	8100					
100	.4	73	56	11.9	82	1730	1590	5700	109	56	1610	1430	2400
110	.8	73	70	13.3	86	2280	2130	8100					
120	1.2	73	84	14.5	89	2830	2670	10800					
120	.1	19	28	16.4	92	970	920	4100	54	56	1860	1750	6700
130	.3	19	35	18.3	94	1250	1200	5700					
140	.5	19	42	20.1	97	1550	1500	7700					
							TOTAL YIELDS				6020	5250	16800

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 250. CUBIC FEET AND 1000. BOARD FEET.
PRECOMMERCIAL INITIAL THINNING ALLOWED. NONCOMMERCIAL SUBSEQUENT THINNINGS NOT ALLOWED.
AT INITIAL AGE 50., 7. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

Table 5

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 116., UNDERSTORY.

SITE INDEX 76
THINNING INTENSITY-- INITIAL- 60. SUBSEQUENT- 60.

STND 116 ANTELOPE 6 CHALENDER RD 76 SECONDARY RUN

	CHARACTERISTICS BEFORE AND AFTER THINNING								PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
50	.1	371	61	5.5	50	1210	460	0					
60	.6	366	84	6.5	57	1780	1120	0					
60	.0+	187	49	6.9	58	1030	710	0	179	35	750	410	0
70	.2	186	65	8.0	65	1500	1210	0					
80	.3	184	81	9.0	71	2080	1800	2000					
80	.0+	125	59	9.3	72	1520	1340	1800	59	22	560	460	200
90	.1	124	72	10.3	77	2030	1830	4100					
100	.2	124	89	11.5	82	2710	2490	8700					
100	.0+	46	42	12.9	83	1300	1210	4500	78	47	1410	1280	4200
110	.1	46	53	14.5	87	1730	1630	6600					
120	.1	46	64	16.0	90	2200	2090	9100					
120	.0+	12	21	17.9	92	740	710	3300	34	43	1460	1380	5800
130	.1	12	26	20.0	95	950	920	4700					
140	.1	12	32	22.0	98	1180	1160	6300					
							TOTAL YIELDS				5360	4690	16300

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 150. CUBIC FEET AND 1000. BOARD FEET.
PRECOMMERCIAL INITIAL THINNING ALLOWED. NONCOMMERCIAL SUBSEQUENT THINNINGS NOT ALLOWED.
AT INITIAL AGE 50., 7. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

*FIN

Table 6